Integrated MVG and ERT Survey Over a Shallow Cave

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Abstract

An integrated geophysical MVG (Microgravity Vertical Gradient) and ERT (Electrical Resistivity Tomography) survey was performed over a shallow cave in the Armetta Mountain karst area, close to the Liguria-Piedmont watershed (Tanaro valley). The aim of this study is to test the response of a known shallow karst cave. The cave was developed in the Mesozoic sedimentary cover (dolostones and limestones - CAU : Caprauna Armetta Unit); the shallowest portion of the cave exhibits narrow passages and, at about 30 m below the entrance, a fossil meander which links two large chambers, that represent the target of the geophysical survey. The site was surveyed with five, 235 m long, ERT sections, crosscutting the underground voids; 53 MVG stations was collected in an area of 150 by 50 meters above the cave. The ERT prospecting was performed using a Syscal R1 (Iris Instrument) multielectrode system with sets of 48 electrodes evenly spaced each 5 meters. A Wenner-Schlumberger array was used. The MVG survey was performed using a LaCoste&Romberg D model gravity meters equipped with a digital data acquisition through the Aliod feedback system, GPS tracking and automatic tide corrections, with a nominal resolution of 1 microGal (10 nm/s^2). Each MVG station was achieved by two successive readings performed at the bottom and top of a 1.80 meters high tower frame. Differential GPS, with acquisition rate of 1 Hz and sampling time of 120 s, was used for the geographic position. The results of the integrated survey show a clear geophysical response of the hollow which exhibits high resistivity values and a negative gravity anomaly. This paper confirms the effectiveness of the geo-

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physical exploration even in a quite complex environment giving a precise location of the voids. The application of such techniques can be efficient in site surveying where the conceivable presence of hollows may be expected.

Key words: Karst Studied, Electrical Resistivity Tomography, Microgravity Vertical Gradient, Void detection

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